

CLAIM AMENDMENTS

Please replace the pending claims with the following claim listing:

1. (Currently Amended) Apparatus for high speed grinding comprising a diamond bonded abrasive wheel, drive means for mounting and rotating the abrasive wheel at peripheral speeds up to approximately 200 m/s, and a liquid coolant supply system including delivery means ~~arranged to direct~~ for directing liquid coolant to a point or zone of grinding contact and a nozzle spaced from the wheel arranged to direct a jet of liquid coolant to the periphery of the wheel to clean the surface of the wheel, wherein the grinding wheel comprises an internal chamber from which liquid coolant can be directed to a grinding surface of said wheel, a number of liquid coolant supplies being directed into the said chamber.
2. (Original) Apparatus as claimed in claim 1, wherein coolant delivery from said supplies into said internal chamber are arranged to be controlled by zone of said chamber.
3. (Original) Apparatus as claimed in claim 2, wherein the chamber has four zones for coolant delivery.
4. (Currently Amended) Apparatus as claimed in claim 2 [[or 3]], wherein the zones of the internal chamber are arranged to be provided with liquid coolant in any combination so that the point or zone of grinding contact, in use, is flooded with coolant.

5. (Currently Amended) Apparatus as claimed in ~~any one of claims 2 to 4~~ claim 2, wherein the zone or zones of the internal chamber can be switched on through a machine control in a manner to ensure the contact point or zone is flooded with liquid coolant.

6. (Currently Amended) Apparatus as claimed in ~~anyone of claims 2 to 5~~ claim 2, in which a controller is provided to control the rotational speed of the wheel and to select a contact zone to which liquid coolant is supplied.

7. (Currently Amended) Apparatus as claimed in ~~any preceding claim~~ claim 1, wherein coolant delivery means is provided through the abrasive wheel, which delivery means comprises a plurality of channels connecting the internal chamber of the abrasive wheel to its exterior surface.

8. (Original) Apparatus as claimed in claim 7 wherein the plurality of channels is provided by radial slots formed in the abrasive wheel.

9. (Currently Amended) Apparatus as claimed in ~~any preceding claim 1~~, wherein liquid coolant supplied to said internal chamber is directed within the chamber by ~~guide means~~ guides towards the point or zone of grinding contact.

10. (Currently Amended) Apparatus as claimed in ~~any preceding claim 1~~, wherein a liquid coolant supply system in use, delivers liquid coolant to the chamber at a pressure up to 100 Bar.

11. (Currently Amended) Apparatus as claimed in any preceding claim 1 wherein the jet of liquid coolant is supplied to the nozzle at a pressure in excess of 40 Bar.

12. (Currently Amended) Apparatus as claimed in any preceding claim 1, wherein coolant delivery routes are provided internally of and externally to the wheel from a single coolant delivery system or mechanism.

13. (Currently Amended) Apparatus as claimed in any preceding claim 1, wherein the jet of liquid coolant to clean the wheel is directed at the periphery of the wheel to a point spaced from the contact zone.

14. (Currently Amended) Apparatus as claimed in any preceding claim 1, wherein second nozzle ~~means~~ is provided and arranged to direct a jet of liquid coolant away from the point or zone of grinding contact in a direction substantially radial to the periphery of the wheel.

15. (Currently Amended) Apparatus as claimed in any preceding claim 1, wherein there further comprises a controller to control the rotational speed of the grinding wheel and select a contact zone to receive liquid coolant.

16. (Currently Amended) Apparatus as claimed in any preceding claim 1, wherein the abrasive wheel is diamond bonded in either a resin, galvanic, vitrified or metal bonded construction.

17. (Currently Amended) Apparatus as claimed in any preceding claim 1, wherein the coolant delivery means is moveable to facilitate an abrasive wheel or workpiece change operation.

18. (Original) Apparatus as claimed in claim 17, incorporating automated nozzle setting including a two-axis motion to permit movement of the coolant supplies out of the internal chamber and then rotation through 90°.

19. (Currently Amended) Apparatus for high speed grinding comprising a multi-axis machining centre including an automated tool changer and apparatus as claimed in any preceding claim 1.

20. (Original) Apparatus as claimed in claim 19, in which the machining centre comprises a machine tool magazine loaded with a plurality of different profiled abrasive wheels as defined in claim 1.

21. (Currently Amended) A method of carrying out a grinding operation on a workpiece at a high material removal rate using apparatus as claimed in any preceding claim 1, which method includes the steps of (i) setting up the abrasive wheel for a series of cuts of potentially different depths either “up cut” or “down cut” grinding; (ii) selecting the required zone of the internal chamber; (iii) setting up the apparatus to direct liquid coolant at the grinding contact point or zone; and (iv) grinding a workpiece by rotating the abrasive wheel in contact therewith at peripheral speeds in excess of 10 m/s.

22. (Original) A method as claimed in claim 21 in which the apparatus comprises a workpiece table, the method further comprising the step of moving the table at a speed in excess of about 2 m per minute.

23. (Currently Amended) A controller constructed and adapted to control high speed grinding apparatus as claimed in ~~any one of claims 1 to 20~~ claim 1, which controller comprises a central processor, a manual input means and separate means controlled by said central processor for controlling individually (i) the liquid coolant supply to the delivery means supplying liquid coolant to the point or zone of grinding contact and (ii) a liquid coolant supply arranged to clean the grinding wheel.

24. (Original) A controller as claimed in claim 23 wherein the means for controlling the liquid coolant supply is a matrix of valves within the liquid coolant delivery system.

25. (Currently Amended) A control system for controlling the operation of an apparatus as claimed in ~~any one of claims 1 to 20~~ claim 1 comprising the steps of (a) activating the liquid coolant supply; (b) selecting rotational speed of abrasive wheel; (c) selecting the nozzle zone of the internal chamber (d) activating a grinding cycle; and (e) terminating the liquid coolant supply.

26. (Currently Amended) A diamond bonded abrasive wheel suitable for use in an apparatus as claimed in ~~any one of claims 1 to 20~~ claim 1, comprising an internal chamber into which a number of liquid coolant supplies can be directed, and coolant delivery means being provided through the abrasive wheel.

27. (Original) An abrasive wheel as claimed in claim 26, wherein the delivery means comprises a plurality of channels connecting its internal chamber to its exterior surface.

28. (Original) An abrasive wheel as claimed in claim 27, wherein the plurality of channels is provided by radial slots formed therein.

29. (Currently Amended) An abrasive wheel as claimed in ~~any one of claims 26 to 28~~ claim 26, in which the diamond is resin bonded.

30. (Currently Amended) An abrasive wheel as claimed in ~~any one of claims 26 to 28~~ claim 26, in which the diamond is galvanic bonded.

31. (Currently Amended) An abrasive wheel as claimed in ~~any one of claims 26 to 28~~ claim 26, in which the diamond is vitrified bonded.

32. (Currently Amended) An abrasive wheel as claimed in ~~any one of claims 26 to 28~~ claim 26, in which the diamond is metal bonded.

33. (Currently Amended) A plurality of abrasive wheels as claimed in ~~any one of claims 26 to 32~~ claim 26 incorporating a different grinding profile.